

IN THE SPECIFICATION:

Please amend the paragraph starting at page 1, line 12, and ending at line 21, as follows.

--Conventional ~~known~~ methods of detecting the position or speed of an moving object can be roughly classified into methods using magnetic encoders and methods using optical encoders. The optical encoder is mainly constituted by a light-emitting portion, light-receiving portion, and scale. The scale is generally manufactured by precision press-cutting or etching by using a thin SUS (stainless steel) plate.--

Please amend the paragraph starting at page 2, line 14, and ending at page 3, line 5, as follows.

--Each scale described above is indirectly coupled to the coupling portion of a rotating shaft through a hub member, ~~it~~. It is difficult to fix the scale to the shaft while maintaining high eccentricity precision between the center of the slit portion formed in the scale and the rotating shaft. This requires high-precision adjustment. Likewise, owing to the above arrangement, it is difficult to keep high squareness precision between the scale and the rotating shaft in the presence of wobbling of the scale surface upon rotation. Furthermore, since a metal scale or film scale has a thickness of 0.2 rom or less, it exhibits poor flatness. As a consequence, the scale suffers from large wobbling (flapping) of the surface. This becomes a factor that causes a deterioration in angle detection precision. It is relatively easy for a glass scale, from which relatively high flatness can be obtained, to improve squareness precision. However, this scale is susceptible to shock, and expensive.--

Please amend the paragraph starting at page 5, line 10, and ending at line 19, as follows.

--The optical scale has a reflecting portion for reflecting light emitted from a light-emitting portion of a sensor having the light-emitting portion and a light-receiving portion and returning the light to the light-receiving portion, ~~wherein a.~~ A shaft holding portion of the optical scale which holds a shaft for rotating the optical scale and the reflecting portion are integrally molded by using a resin, ~~and the.~~ The shaft holding portion and the reflecting portion are formed on a single surface of the optical scale.--

Please amend the paragraph starting at page 15, line 8, and ending at line 25, as follows.

--The optical axis of the concave mirror 4 and central ray (principal ray) of incident light beam are offset from each other by an eccentricity amount Δ , as shown in Fig. 4. The concave mirror 4 reflects convergent light beams (three diffracted light beams) diffracted and focused by the optical scale 3 to re-form an interference pattern image (image) based on the three diffracted light beams on a second area 3b on the surface of the optical scale 3. In this case, when the optical scale 3 moves in a rotating direction 6, the re-formed image moves in the opposite direction to the rotating direction 6. That is, the grating portion and interference pattern image are relatively displaced by a value twice the moving amount of the optical scale 3. In this embodiment, with this operation, rotation information ~~with~~ has a resolution twice that of the grating portion is formed on the optical scale 3.--

Please amend the paragraph starting at page 17, line 18, and ending at page 18, line 4, as follows.

--In the first area 3a, the V-groove grating portion 3d has the same optical effect as that of a transmission-type amplitude diffraction gating. A light beam is diffracted by the grating portion 3d in the first area 3a, and diffracted light such as 0th-, \pm 1st-, or \pm 2-order light is produced by the effect of the diffraction grating portion. The diffracted light is then focused on the surface of the concave mirror 4. The focused diffracted light is reflected by the concave mirror 4 which is offset from a principal ray 10la, and is re-formed into an image in the second area 3b of the optical scale 3, thereby re-forming an image (radial groove image) on the surface of the optical scale 3.--

Please amend the paragraph starting at page 20, line 11, and ending at line 22, as follows.

--In this case, as the optical scale 3 rotates, the amounts of light detected by the photodetectors 5a, 5b, and 5c change. The balance between the amounts of light incident on the respective photodetectors changes in accordance with the relative displacements of the position of the grating portion 3d and image. As a consequence, if the optical scale 3 is rotated counterclockwise, a change in light amount accompanying the rotation of the optical scale 3, like that shown in Fig. 5C, is obtained. Referring to Fig. 5C, the abscissa represents the rotation amount of the optical scale 3, and the ordinate, the amount of light received.--

Please amend the paragraphs starting at page 24, line 1, and ending at line 7, as follows.

--Light transmission-type optical scales (encoders) have been described in the first to 13th embodiments. In the 14th embodiment, a light reflection-type optical scale (encoder) will be described.

Fig. 20 is a perspective view showing the scale reflection portion of an optical reflection-type encoder scale.--

Please amend the paragraph starting at page 26, line 21, and ending at line 25, as follows.

--The reflection portion OE obtained by ~~arraying forming in an array~~ a plurality of roof mirrors, each having two reflecting surfaces 103a and 103b opposing each other at a predetermined angle, in a one-dimensional direction is formed on one surface of a transparent substrate 103e.--

Please amend the paragraph starting at page 31, line 11, and ending at line 13, as follows.

--Figs. 22 and 23 are sectional view taken along the lines A - A and B - B in Fig. 21. Reference The reference numerals used in Figs. 22 and 23 will be described below:--

Please amend the paragraph starting at page 34, line 4, and ending at line 27, as follows.

--A shaft mount portion 103f and ray reflection functioning portion (V-groove) 111 are formed by using a single mold portion. The scale 103 of this embodiment is formed by using a movable platen 112 and a fixed platen 107 having one pin disk gate 110. With this structure, a molten resin uniformly flows around the pin gate located in the center in the radial direction to obtain uniform characteristics and precision in the circumferential direction in terms of stress distribution and dimensional precision. In addition, since the reflecting portion and shaft fitting portion are arranged in the same mold portion, a molded product having a shape like the one shown in Fig. 38 is obtained. When this scale is mounted on the rotating shaft of a motor or the like, the reflecting portion is located near the bearing. Even if, therefore, turning (whirling) of the shaft occurs due to bearing backlash and play, eccentricity errors and vertical movement of a reflecting surface in the axial direction can be ~~suppressed~~ made low. In addition, a detection head can be housed within a height h of a projection portion for ensuring the fitting length of the scale, producing a great effect in reducing the profile of the unit.--